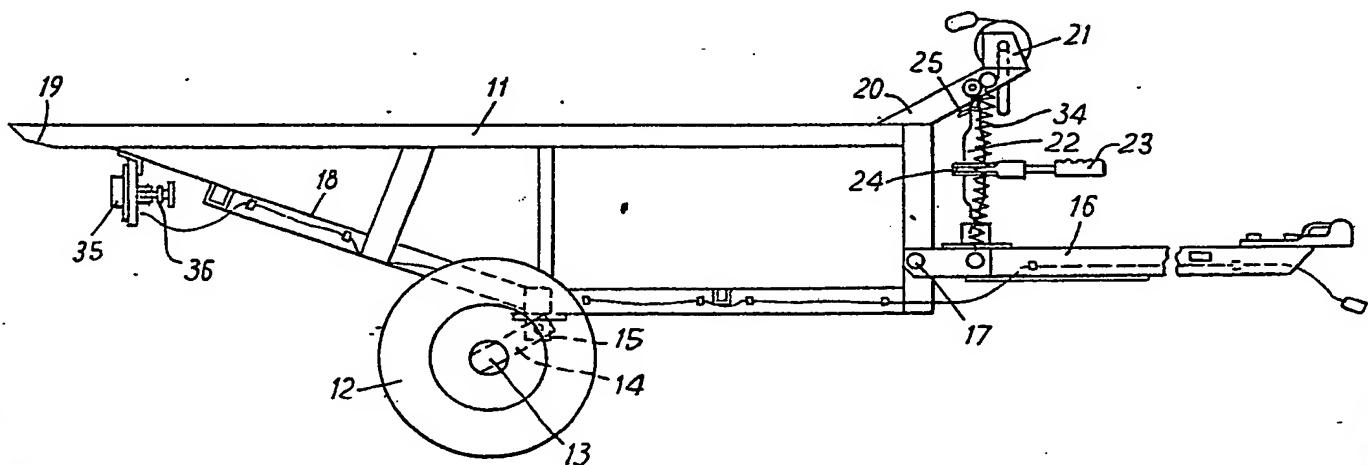




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 3: B60P 1/08, 1/18; B62D 63/06, 53/06		A1	(11) International Publication Number: WO 81/02712 (43) International Publication Date: 1 October 1981 (01.10.81)
(21) International Application Number: PCT/GB81/00051			(81) Designated States: AT (European patent), AU, BR, CH (European patent), DE (Utility model), DE (European patent), DK, FI, FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US.
(22) International Filing Date: 20 March 1981 (20.03.81)			
(31) Priority Application Number: 8009763			
(32) Priority Date: 22 March 1980 (22.03.80)			
(33) Priority Country: GB			
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(54) Title: TILTING TRAILERS FOR VEHICLES



(57) Abstract

The trailer body (11) is carried on two wheels (12) and is tiltable about the wheel axle to place the edge (19) on the ground. Drawbar (16) is pivotally attached to the body (11) at (17) and is coupled to the body by a bottle screw (22) operable by a handle (23) through a ratchet (24) to effect tilting. A tension spring (34) prevents rattle and facilitates one-handed operation of the ratchet. It also aids lifting of loads placed on the rear wall (18) of the body (11).

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TILTING TRAILERS FOR VEHICLES

This invention relates to vehicle trailers.

For many purposes it is useful to be able to tip a trailer, either for off- or on-loading. This can be simply done with a two wheeled, centrally balanced trailer by detaching it from the towing vehicle and tilting the body about the wheel axle. For larger trailers, sometimes with four or more wheels, there is the alternative of pivoting the load-carrying member, such as a platform or an open-topped container with a hinged or removable tailgate, about a transverse axis at the rear. The raising of the front of the load-carrying member is generally done hydraulically. With this arrangement the trailer can remain attached to the towing vehicle, but the power required is considerable, it is sometimes a disadvantage to discharge the load from a height, and it requires an intermediate ramp for on-loading a body by sliding or rolling from the ground.

There have been proposed trailers in which the draw-bar is pivotally connected to the chassis or load-carrying container forward of the only or rearmost wheel axle. In the towing position the container and draw-bar are locked together in a generally level attitude, but for loading, while the draw-bar remains attached to the towing vehicle the container can be tilted on the only or rearmost wheels, the draw-bar pivoting relative to it as well. There are various ways of securing the draw-bar and container in the towing position, effectively locking them rigidly together. In order to have some control over the tilting, one proposal has been to use a bottle-screw which can be lengthened to tilt the container and which is self-locking. However, when using commercially available bottle-screws and fabricating the connections for them, it is impractical to try to achieve extremely close tolerances. It could be done, but at considerable expense and trouble. Therefore, the tendency is for there to be some looseness in the connections, and for the trailer to rattle and vibrate, thus hastening wear and widening the tolerances even further.



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Another problem has been in the load which can conveniently be handled. When the container is fully tilted so that its rear end is resting on the ground, a heavy load is manoeuvred to sit on the rear extremity of the container, which when level is a shallow 5 sloping wall and which when tilted is an even shallower ramp almost level with the ground and sloping in the opposite direction. As the bottle-screw is operated to raise the container to the level position, the load can be eased forward to balance the trailer. But at the initial point of lift very considerable force is required 10 to raise it. This can make the bottle-screw difficult to operate.

A further difficulty lies in the operation of the bottle-screw. A ratchet handle has been developed which can be worked to and fro to extend or reduce its length, but it still requires the operator's other hand to hold another part of the screw to achieve 15 proper functioning. It is desirable for the ratchet to be one-handed, leaving the operator's other hand free, perhaps to guide the load.

In accordance with the present invention there is provided a trailer having a draw-bar pivotally connected to the load-carrying 20 structure forward of the only or rearmost wheel axle, jack means connected between the drawbar and the load-carrying structure to tilt the said structure about the said wheel axle while the draw-bar remains attached to the towing vehicle, and spring means interconnecting the draw-bar and the load-carrying structure to urge the latter 25 towards a level attitude.

Such a spring has been found to eliminate the rattles, and considerably increase the load which can be raised at the rear end of the container. Although the tilting from the level position has to be done against the action of the spring, this is quite easily 30 achieved with a bottle screw or with a hydraulic jack. When a screw jack is used in conjunction with a ratchet, the spring facilitates one-handed operation of the ratchet.

All trailers must carry a number plate and light assembly, and generally this will be fitted below the sloping rear end of the 35 container. As the latter tilts, there is a danger of the number

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plate assembly hitting the ground. A further feature described below is to link this assembly to the draw-bar so that as the container is tilted, the number plate assembly is automatically retracted.

5 The invention will be described in more detail with the aid of an example illustrated in the accompanying drawings, in which

Fig. 1 is a side elevation of a tilting trailer in accordance with the invention,

Fig. 2 is a partial view of the front end of the trailer,

10 and

Fig. 3 is a detail section on the line III-III in Fig.2.

The trailer has a load-carrying container 11 which is mounted on a pair of wheels 12 rotating about a wheel axle 13. The wheel axle is formed by two stub axles each of which is carried on a swing link 14 attached to the base of the container 11 by a torsion spring 15. The trailer is towed by means of a draw-bar 16 connected to the front of the container 11 by a pivot 17 whose axis is parallel to the wheel axle 13. The container 11 is an open box-like structure, generally rectangular but with a rear wall 18 which, when the trailer is in the towing position shown, slopes upwardly and rearwardly at a shallow angle. When the container is tilted about the axle 13, the rear edge 19 of this wall 18 will touch the ground, and the wall 18 will slope up from that edge at a very shallow angle.

25 A bracket 20 projects upwardly and forwardly from the centre of the top of the front wall of the container 11. A winch 21 is carried on this bracket, and is manually operable to help draw loads on to the trailer when tilted. Between the bracket 20 and the draw-bar 16 there is a bottle-screw 22 operable by a handle 23 through a ratchet device 24, which can be switched either to lengthen or shorten the bottle-screw as the handle is worked to and fro. As the bottle-screw is extended, the container will tilt about the axle 13, while the draw-bar 16 can still remain attached to the towing vehicle. When the trailer is being towed, the container 11 is adjusted to be level, and the bottle-screw 22, although to a great extent self-locking, can be further secured by a locking tab 25.



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Referring to Fig.2 it will be seen that the bottle-screw 22 comprises two couplings 26 and 27 pivotally connecting the bottle-screw with the draw-bar 16 and the bracket 20, respectively. Two threaded pins 28 and 29 of opposite hand are screwed into the ends 5 of the body 30 of the bottle screw so that upon rotation of the body the pins 28 and 29 are forced apart or pulled together. Rotation of the body 30 is effected by using the handle 23 to swing an arm 31 (Fig.3) which engages a ratchet wheel 32 by way of a reversible pawl 33. The locking tab 25 is threaded on the pin 29 and acts as a lock-nut against the end of the body 30.

There also acts between the bracket 20 and the draw-bar 16 a powerful coiled tension spring 34. This urges the container 11 towards the level position, and assists in raising loads placed on the rear wall 18, but it can be overcome, for tilting the trailer, 15 by operation of the bottle-screw 22.

Below the sloping rear wall 18 there is suspended a number plate and light assembly 35. The assembly 35 is hinged and is provided with a clip 36 engageable with the underside of the wall 18 to hold the assembly 35 in a folded back position when the trailer is 20 being tipped. In an alternative construction the folding back of the number plate assembly is effected automatically as the body 11 tilts by means of a cable coupling the assembly to the draw-bar and pulling against a spring bias.

As suggested above, there can be different means for tilting 25 the container, for example a hydraulic jack. This also is self-locking, which is desirable since not all towing points are at the same height and it is useful to be able to set the container level whatever the towing vehicle. If the draw-bar were secured by, say, a locking pin such an infinitely adjustable feature would not be 30 possible. A pneumatic ram would also be possible, and particularly with that type of piston and cylinder actuator the spring could be internal, acting between the piston and one end of the cylinder, and conveniently being in the chamber where it can act as a compression spring. The pump (and reservoir in the case of the hydraulic jack) 35 can be mounted on the draw-bar or on the container.



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A coil spring is not the only possibility. For example a leaf-type spring might project forwardly from below the container to act on the underside of the draw-bar.



CLAIMS:

1. A trailer having a draw-bar pivotally connected to the load-carrying structure forward of the only or rearmost wheel axle, jack means connected between the drawbar and the load-carrying structure to tilt the said structure about the said wheel axle while the draw-bar remains attached to the towing vehicle, and spring means interconnecting the draw-bar and the load-carrying structure to urge the latter towards a level attitude.
2. A trailer as claimed in claim 1 in which the jack means is a screw jack.
3. A trailer as claimed in claim 2 in which the screw jack is a bottle screw.
4. A trailer as claimed in claim 3 or 4 in which the jack means includes a reversible ratchet operable by a swingable arm to lengthen or shorten the jack means.
5. A trailer as claimed in any of the preceding claims in which the spring means comprises a coiled tension spring.



AMENDED CLAIMS

(received by the International Bureau on 17 August 1981 (17.08.81))

1. A trailer having a draw-bar (16) pivotally connected (at 17) to the load-carrying structure (11) forward of the only or rearmost wheel axle (13), a jack (22) connected between the draw-bar and the load-carrying structure to lift the said structure relative to the draw-bar and thereby tilt the said structure about the said wheel axle while the draw-bar remains attached to the towing vehicle and a spring (34) interconnecting the draw-bar and the load-carrying structure and acting against the said tilting characterized in that the jack is a bottle screw (23 to 30) operable to effect tilting and return movements of the load-carrying structure and the spring is a coiled tension spring (34).
2. A trailer as claimed in claim 1 characterized in that the bottle screw comprises a reversible ratchet (24) operable by a swingable arm (23) to lengthen or shorten the bottle screw.



EDITORIAL NOTE

The applicant failed to renumber the amended claims in accordance with Section 205 of the Administrative Instructions.

In the absence of any specific indication from the applicant as to the correspondence between original and amended claims, these claims are published as filed and as amended.

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FIG. 1

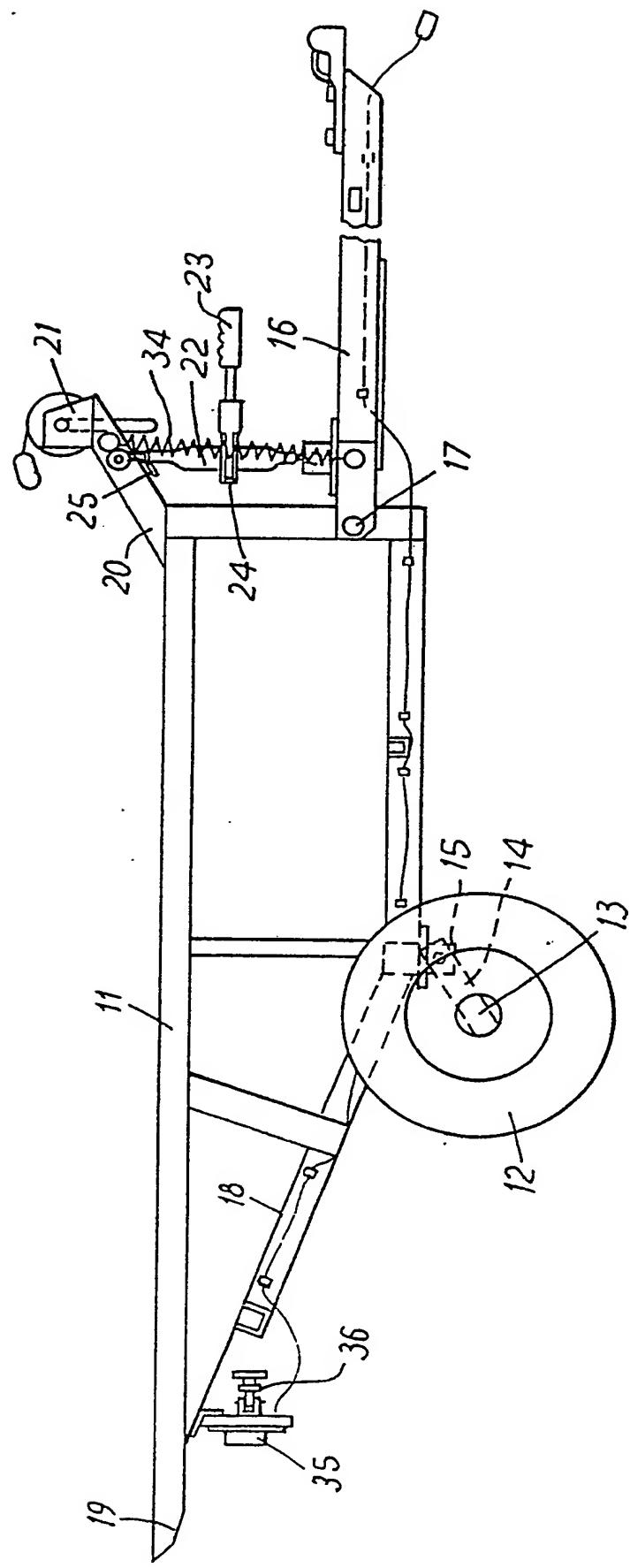


FIG. 2

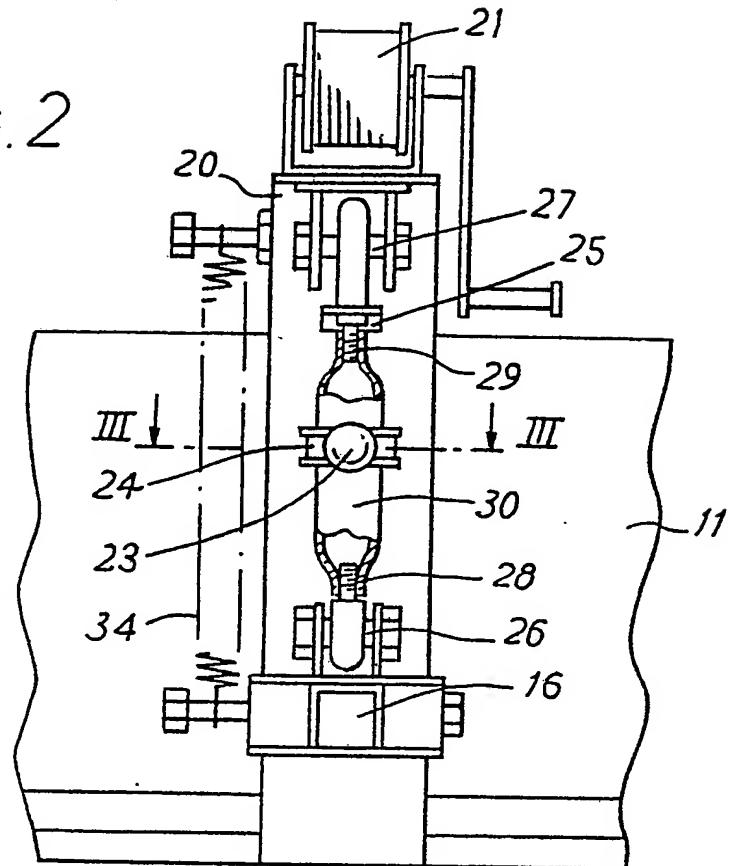
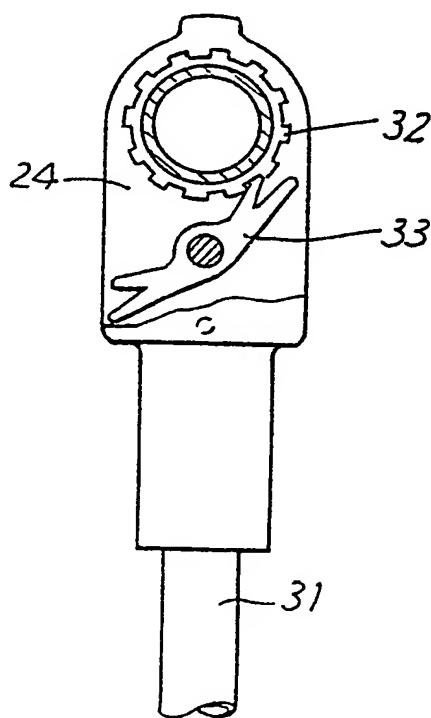


FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 81/00051

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all):

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. ³ B 60 ~~1/08~~; B 60 P 1/18; B 62 D 63/06;
B 62 D 53/06

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System ⁵	Classification Symbols
Int.Cl. ³	B 60 P; B 62 D
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁶	

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ¹⁵	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X	US, A, 2718431, published 20th September 1955, see column 2, lines 40-72; figures 5 and 6, Pietroroia -- FR, A, 1251239, published 12th December 1960, see page 1; figure 1, Rumeau -- GB, A, 541205, published 17th November 1941, see the whole document, Good -- US, A, 2995399, published 8th August 1961, see the whole document, Riseborough -- US, A, 4133440, published 9th January 1979, see the whole document, Heidrick -- FR, E, 93570/FR, A, 1361551, published 18th April 1969, see page 2, lines 18-22; figure 1, Chappaz -- DE, C, 806319, published 29th March 1951, see the whole document, Knöbel -- US, A, 3450281, published 17th June 1969, see the whole document, Groberg --	1,5 1,4 1,2 1 1 1 1 1,2 1

¹⁵ Special categories of cited documents:¹⁶ "A" document defining the general state of the art¹⁷ "E" earlier document but published on or after the international filing date¹⁸ "L" document cited for special reason other than those referred to in the other categories¹⁹ "O" document referring to an oral disclosure, use, exhibition or other means²⁰ "P" document published prior to the international filing date but on or after the priority date claimed²¹ "T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention²² "X" document of particular relevance

IV. CERTIFICATION

Date of the Actual Completion of the International Search ²³

12th June 1981

Date of Mailing of this International Search Report ²⁴

24th June 1981

International Searching Authority ²⁵
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
A	US, A, 3977726, published 31st August 1976, Prestayko	
A	FR, A, 2039492, published 15th January 1971, Mallet	1
A	FR, A, 2055650, published 7th May 1971, Craske	1
A	FR, A, 1261388, published 10th April 1961, Large	1
A	FR, A, 1277282, published 16th October 1961, Chardon	3
A	DE, B, 1075441, published 11th February 1960, François	1
A	FR, A, 729710, published 30th July 1932, Bennewood	
